

WHAT IS CLAIMED IS:

1. A grain quality judging sample container comprising:  
a sample bed having a transparent bottom face for placing grains thereon;

a light source disposed above said sample bed for emitting a light to illuminate the samples placed on said sample bed; and

an oblique ray louver for homogenizing the light emitted from said light source, in an oblique direction so that the grains placed two-dimensionally on said sample bed may be irradiated with the light in the oblique direction.

2. A grain quality judging sample container comprising:  
a sample bed having a transparent bottom face for placing grains thereon; and

a multiplicity of light emitting elements arrayed two-dimensionally to have a light emitting direction inclined with respect to the sample placing face of the sample bed, so that the grains placed two-dimensionally on said sample bed may be irradiated with the light in the oblique direction.

3. A grain quality judging sample container comprising:  
a sample bed having a transparent bottom face for placing grains thereon;

a light emitting element array including a multiplicity of light emitting elements arrayed one-dimensionally to have a light emitting direction inclined with respect to the sample placing face of said sample bed, so that the grains placed on said sample bed may be irradiated with the light in the oblique direction; and

moving means for moving at least one of said sample bed and said light emitting element array in a direction to intersect an array direction of said light emitting elements.

4. A grain quality judger comprising:

a grain quality judging sample container according to Claim 1;

a scanner for reading images of the grains from a bottom face side of the grain quality judging sample container; and

judging means for judging quality of the grains on the basis of the images of the grains read by said scanner.

5. A grain quality judger comprising:

a grain quality judging sample container according to Claim 2;

a scanner for reading images of the grains from a bottom face side of the grain quality judging sample container; and

judging means for judging quality of the grains on the basis of the images of the grains read by said scanner.

6. A grain quality judger comprising:

a grain quality judging sample container according to Claim 3;

a scanner for reading images of the grains from a bottom face side of the grain quality judging sample container; and  
judging means for judging quality of the grains on the basis of the images of the grains read by said scanner.

7. An image inputting method using a grain quality judger according to Claim 4, for extracting both information on a grain inside and information on a grain surface by inter-image operations of a reflected optical image, as read by turning OFF the light in the inclined direction, and an image, as read by turning ON the light in the inclined direction.

8. An image inputting method using a grain quality judger according to Claim 5, for extracting both information on a grain inside and information on a grain surface by inter-image operations of a reflected optical image, as read by turning OFF the light in the inclined direction, and an image, as read by turning ON the light in the inclined direction.

9. An image inputting method using a grain quality judger according to Claim 6, for extracting both information on a grain

inside and information on a grain surface by inter-image operations of a reflected optical image, as read by turning OFF the light in the inclined direction, and an image, as read by turning ON the light in the inclined direction.

10. A grain quality judging system terminal providing a grain quality judger according to Claim 4, with functions: to accumulate images and judgment results; to compress data; to encrypt data; to record data in auxiliary storage device media; to print data; to distribute data through a network; and to protect data by a password.

11. A grain quality judging system terminal providing a grain quality judger according to Claim 5, with functions: to accumulate images and judgment results; to compress data; to encrypt data; to record data in auxiliary storage device media; to print data; to distribute data through a network; and to protect data by a password.

12. A grain quality judging system terminal providing a grain quality judger according to Claim 6, with functions: to accumulate images and judgment results; to compress data; to encrypt data; to record data in auxiliary storage device media; to print data; to distribute data through a network; and to protect data by a password.

13. A grain quality judging system comprising:

a plurality of grain quality judging system terminals connected with a network and according to Claim 10; and

administration means connected with said network for displaying the image read by said system terminal and the judgment result of said judging means.

14. A grain quality judging system comprising:

a plurality of grain quality judging system terminals connected with a network and according to Claim 11; and

administration means connected with said network for displaying the image read by said system terminal and the judgment result of said judging means.

15. A grain quality judging system comprising:

a plurality of grain quality judging system terminals connected with a network and according to Claim 12; and

administration means connected with said network for displaying the image read by said system terminal and the judgment result of said judging means.

16. A grain image reading device comprising:

a scanner body including: a sample bed disposed at an image reading position and having a bottom portion made of a

transparent material for placing grains two-dimensionally thereon; and scan means having an optical irradiation portion made movable along the bottom portion of said sample bed for irradiating the grains with a light, and a light receiving portion for receiving a reflected light reflected by the grains; and

a cover member made openable/closable with respect to the sample bed of said scanner body and including oblique ray means for irradiating the grains obliquely when closed,

wherein an image of the grains is read by using two kinds of lights: a transmitted light emitted from said oblique ray means, transmitted through the grains and received by the light receiving portion of said scan means; and a reflected light emitted from said optical irradiation portion, reflected by the grains and received by the light receiving portion of said scan means.

17. A grain image reading device according to Claim 16,

wherein said oblique ray means includes: a grain irradiating light source; and an oblique ray louver for regulating an irradiation direction so that the grains may be homogeneously irradiated in an oblique direction with an emitted light emitted from the light source.

18. A grain image reading device according to Claim 16,

wherein said oblique ray means includes a plurality of light emitting elements arrayed two-dimensionally and set in a light emitting direction to irradiate the grains in the oblique direction with their lights.

19. A grain image reading device according to Claim 16, wherein said oblique ray means includes a plurality of light emitting elements arrayed one-dimensionally and set in a light emitting direction to irradiate the grains in the oblique direction with their lights, and

wherein at least one of said light emitting elements and said sample bed is moved in a direction to intersect an array direction of said light emitting elements.

20. A grain quality judging device comprising:  
a grain image reading device according to Claim 16; and  
judging means connected with said grain image reading device for judging grain quality on the basis of image information sent from said grain image reading device.

21. A grain quality judging device according to Claim 20, wherein said scan means outputs to said judging means both: image information, which is obtained, with both the light source of said oblique ray means and the optical irradiation portion of said scan means being turned ON, at the time when

both the transmitted light emitted from the former light source and transmitted through the grains and the reflected light emitted from the latter and reflected by the grains are simultaneously received by said light receiving portion; and image information, which is obtained, with the light source of said oblique ray means being turned OFF but with said optical irradiation portion being turned ON, at the time when only the reflected light emitted from the latter and reflected by the grains is received by said light receiving portion, and

wherein said judging means determines image information at the time when only the transmitted light is received, by subtracting the image information at the time when only the reflected light is received, from the image information at the time when the transmitted light and the reflected light are simultaneously received, and judges the grain quality.

22. A grain quality judging device according to Claim 20,

wherein said scan means outputs to said judging means both: image information, which is obtained, with both the light source of said oblique ray means and the optical irradiation portion of said scan means being turned ON, at the time when both the transmitted light emitted from the former light source and transmitted through the grains and the reflected light emitted from the latter and reflected by the grains are simultaneously received by said light receiving portion; and



image information, which is obtained, with the light source of said oblique ray means being turned ON but with said optical irradiation portion being turned OFF, at the time when only the transmitted light emitted from the former and transmitted through the grains is received by said light receiving portion, and

wherein said judging means determines image information at the time when only the reflected light is received, by subtracting the image information at the time when only the transmitted light is received, from the image information at the time when the transmitted light and the reflected light are simultaneously received, and judges the grain quality.

23. A grain quality judging device according to Claim 20, wherein said scan means outputs to said judging means both: image information, which is obtained, with the light source of said oblique ray means being turned ON but with the optical irradiation portion of said scan means being turned OFF, at the time when only the transmitted light emitted from the former light source and transmitted through the grains is received by said light receiving portion; and the image information, which is obtained, with the light source of said oblique ray means being turned OFF but with said optical irradiation portion being turned ON, at the time when only the reflected light emitted from the latter and reflected by the

grains is received by said light receiving portion.

24. A grain image reading device comprising:

a scanner body including: a sample bed disposed at an image reading position and having a bottom portion made of a transparent material for placing grains two-dimensionally thereon; and scan means having an optical irradiation portion made movable along the bottom portion of said sample bed for irradiating the grains with a light, and a light receiving portion for receiving a reflected light reflected by the grains; and

a cover member made openable/closable with respect to the sample bed of said scanner body and including a light source for irradiating the grains obliquely when closed,

wherein the optical irradiation portion of said scan means has an optical axis direction set to have a predetermined angle of inclination with respect to the sample placing face of said sample bed, and

wherein said light source is so fixed on the end side of the sample placing face of said sample bed in said cover member as to have an optical axis direction set at a predetermined angle of inclination with respect to the sample placing face of said sample bed.

25. A grain image reading device according to Claim 24,

wherein the optical irradiation portion of said scan means and said light source are so constructed as can be turned ON/OFF independently of each other.

26. A sample arraying jig for a grain image reading device having a scanner body including: a sample bed disposed at an image reading position and having a bottom portion made of a transparent material for placing grains two-dimensionally thereon; and scan means having an optical irradiation portion made movable along the bottom portion of said sample bed for irradiating the grains with a light, and a light receiving portion for receiving the reflected light reflected by the grains, comprising:

a sample arraying jig body formed into such a tray shape as can be placed on an upper face of the bottom portion of said sample bed, and including a bottom wall portion having such a multiplicity of holes at a predetermined interval as has a size to admit one grain, as formed generally into a grain shape and as has a longer axis direction in a predetermined direction; and

a moving member formed to such a size as can slide on the upper face of the bottom wall portion of the sample arraying jig body and as can be placed on the upper face of said bottom wall portion, and having a multiplicity of second holes having the same shape and pattern as those of said multiple first

holes.

27. A sample arraying jig for a grain image reading device according to Claim 26,

wherein said sample arraying jig body has a discharge port at its side wall portion for discharging excessive grains, and a non-hole portion disposed on at least one peripheral portion side of said moving member for giving refuge to the remaining grains.

28. A sample arraying method using a sample arraying jig for a grain image reading device according to claim 27, comprising:

a first step of placing said moving member on the upper face of the bottom wall portion of said sample arraying jig body and holding the two in a state with the second holes being offset from the first holes;

a second step of putting grains as samples in the sample arraying jig body in the state and introducing said grains one by one into the second holes;

a third step of placing said sample arraying jig body and said moving member in the state on the upper face of the bottom portion of the sample bed;

a fourth step of sliding said moving member with respect to the bottom wall portion of said sample arraying jig body and overlaying the second holes on the first holes; and

a fifth step of lifting and removing said sample arraying jig body and said moving member in the state from the sample bed.

29. A sample arrayer for a grain image reading device having a scanner body including: a sample bed disposed at an image reading position and having a bottom portion made of a transparent material for placing grains two-dimensionally thereon; and scan means having an optical irradiation portion made movable along the bottom portion of said sample bed for irradiating the grains with a light, and a light receiving portion for receiving a reflected light reflected by the grains, comprising:

a sample arraying plate formed into a tray shape, and including a bottom wall portion having such a multiplicity of holes at a predetermined interval as has a size to admit one grain, as formed generally into a grain shape and as has a longer axis direction in a predetermined direction; and

a sample arrayer body including: a support member formed generally into such a frame shape as can fit the bottom wall portion of said sample arraying plate; and a transparent plate arranged on the bottom portion of said support member and placed on the upper face of the bottom portion of said sample bed for placing the bottom wall portion of said sample arraying plate.

